TABLE 1.—*Record of breathing well at New Carlisle, Ohio, and pressure-changes at Columbus, Ohio, February, 1916.*

Date.	Weat	Well blew—		Remarks.	Columbus, Ohio, 12-hour pressure-changes.	
		A. M.	P. M.		8 a. m.	8 p. m.
Feb. 1	Fair	In	In		0.28	0.16
2		Out	Out	Snow flurry at night	−0.12	None.
3		In	In		0.10	0.06
4		In	Out	In to 9 a. m.; out at 1 p. m.	0.08	−0.18
5		Out		Out till evening	−0.22	−0.04
6	Snowing	Out		Stopped blowing in evening.	−0.22	None.
7		In	Quiet	Quiet at 8 p. m.	0.26	0.26
8			Out		−0.06	−0.34
9		Quiet	In	Quiet at 9 a. m.	0.06	0.24
10		In	Out	In till 9 a. m.; out at 1 p. m.	0.08	−0.02
11	Raining	Out	In	In at 4 p. m.	−0.14	−0.14
12				[No record]	−0.10	0.12
13	Snow flurries	In	In	Snow flurries, p. m.	0.22	0.24
14		In	Out	Out at 4 p. m.	0.10	−0.06
15		Out	Out		−0.08	−0.16
16		Out	Out		−0.18	−0.22
17		Out	Out		−0.06	−0.04
18	Blizzard	Out	In	In at 3 p. m.	−0.16	0.28
19	Snowing	In	Out	Out at 1 p. m.	+0.10	−0.10
20		Out	In	In at 1 p. m.	−0.24	0.24
21		In	Out	Out in evening	0.34	−0.10
22		Out	Out		−0.16	−0.20
23		Out	In	Out until 9 a. m.; in in evening.	−0.06	0.10
24		Out	Out		−0.14	−0.06
25		Quiet	Quiet		−0.06	0.10
26	Snowing	Out	In	Out until 2 p. m.	−0.16	0.06
27		In	In		0.22	0.14
28		In	Out	In until 2 p. m.	0.06	−0.14
29		Out	In	Out until 9 a. m.	−0.04	0.16

Columbus, Ohio, is about 55 miles (87 kilometers) almost due east of New Carlisle, and its pressure changes may be taken as sufficiently representative of those taking place at New Carlisle to serve for comparison with the well breathings. It appears from Table 1 that, out of 56 recorded pressure-changes and well "breathings," *rising pressure-changes* were accompanied by inspirations 22 times and no breathing in 4 cases, while *falling pressure-changes* were accompanied by expiration 27 times and by no breathing only twice. On one occasion (afternoon of the 11th) there seems to have been a case of inspiration during apparent falling pressure, which may represent an occasion of temporary rise in pressure between the two telegraphic reports given in the table.

The table will make it plain that even though the daily weather maps show no *centers* of high or of low pressure passing directly over Ohio, and certainly not over New Carlisle, nevertheless the atmosphere over the State was constantly varying in pressure as storms traveled across the country. Thus, from the morning of the 1st to the evening of the 4th of February, 1916, Mr. Free's well was taking in air, predominantly, while the synchronous pressure changes were predominantly positive. This was under the influence of the general rise in pressure due to the eastward movement of the high area whose crest occupied the Dakotas, Nebraska, and Kansas on the morning of February 1, but had moved across Ohio to West Virginia by the morning of February 4.

Again on February 13–14 the well was breathing in under the influence of a slightly rising pressure which changed to falling pressure on the afternoon of the 14th, and the well exhaled continuously for four days as the pressure steadily fell before the advance of the southern periphery of a great low whose center never came south of the Great Lakes. During this period Ohio was always on the southern skirts of the depression; the center of the low did not pass over Ohio.

Applications of this phenomenon.—This relation between pressure-changes and earth breathing has been recognized and studied for some time. Private efforts have been made in England, and to some extent in this country, to utilize the pressure-changes in forecasting conditions favorable to explosions of gases in mines. England has not made public efforts to forecast such conditions for the benefit of the mine operators, but Dr. W. N. Shaw, Director of the Meteorological Office, has outlined a scheme looking toward the preparation of such forecasts.[1] In the United States the Weather Bureau does not issue official forecasts or warnings of conditions producing mine explosions; but it authorizes certain of its local forecasters to telegraph marked changes in pressure to the mine operators and thus enables the latter to form their own conclusions as to the probability of danger.—C. A., jr.

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ALTO-CUMULUS WITH VIRGULUS.

The cloud form illustrated by a rough sketch in REVIEW for December, 1915, page 614, but more properly called "alto-cumulus with virgulus" (as was pointed out by Prof. Talman in the issue for January, 1916, p. 2) seems to be better known in the United States than the first correspondent thought.

Mr. J. B. Willsea, of Fruita, Colo., writes under date March 25, 1915,—

> This class of clouds is seen frequently in this valley [Grand River] especially in the spring when we are watching for frosts that do our fruit blossoms.
>
> Possibly some may be interested in the shape of these clouds as we see them here. I will try to make sketches of them this spring.

Mr. Willsea calls our attention to the fact that these clouds were described and sketched but not specifically named at Blue Hill, Mass., as long ago as 1888. The following is taken from H. H. Clayton's "Discussion of cloud observations:"[2]

> The formation of cirrus from clouds of the cirro-cumulus or alto-cumulus type has been repeatedly observed. Figures *m*, *n*, [op. cit., Plate VI], are all taken from rough sketches made by the writer at the time of observation. These forms apparently all result from descending cloud particles. The heavy particles fell first and succeeding particles followed the same path on account of the less resistence, and thus formed long fibers which were usually carried backward from the cloud on account of the decrease of wind velocity with lower altitude. The form *m*, with fibers suspended nearly vertical, was observed on several occasions, and care was taken to ascertain that the apparently nearly vertical direction of the fibers was not an effect of perspective. As a rule, the suspended fibers were drawn backward in the direction from which the cloud moved, as shown in *n*. On watching these clouds it is seen that the fibers move continually outward from the clouds, until the entire cloud is drawn out into cirrus. Several times cirrus (!) were observed to elongate from the top of cirro-cumulus clouds, as shown in figure *k*, Plate VI, the sketch made July 3, 1888, the cirrus being apparently drawn out by a more rapid current at the top than at the base of the cirro-cumulus. Similar formations of cirrus from the tops of the cirro-cumulus clouds were observed on several occasions.
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> The writer has also repeatedly seen cirrus-like fibers drawn out from small cumulus clouds, sometimes from the top and sometimes from the base of the cloud, and once from both at the same time, thus giving the cloud a very fibrous appearance. Most of these cases occurred during the latter part of winter or in the spring, and usually accompanied the setting in of a very low temperature, sometimes below zero Fahrenheit. These clouds appear to float at the same altitude as ordinary cumulus. The following note of measurements made on the velocities and altitudes of this type of cloud was recorded on March 3, 1894: "At 3 p. m., one or two large cumulus in the south had

[1] See his "Forecasting weather". London, etc., 1911, pp. 306–312.

[2] Observations made at the Blue Hill Meteorological Observatory. Discussion of the cloud observations, by H. Helm Clayton. Cambridge, Mass., 1896, pp. (Annals, Astronomical Observatory, Harvard College, 30, pt. 4.)

like fibers extending from base and summit. From several measurements of the velocities of the shadows of these clouds the base was found to have a velocity of 15.0 meters per second, and the top about 17.8 or 18.0 meters per second (determined from the velocities of the rear and the front of the shadows respectively). These, combined with measurements of the angular velocity of the cloud, give an altitude of 1,820 meters for the base of the cloud above Blue Hill. The altitude, determined in another manner from the position of the cloud shadow and the angular altitude of the cloud, was calculated to be 2,200 meters above the hill."

SEVERE ICE STORM IN MICHIGAN.

The Weather Bureau storm-warning displayman at St. James, Beaver Island, Mich., Rev. Edward J. Jewell, reports that a severe ice storm visited his station at the close of January, 1916. He writes, in part, as follows:

During the night of January 27 a great weight of sleet accumulated [on the halyards of the steel storm-warning signal display tower] and the heavy wind drove them over—all four—to one side of the [steel] mast, bending the mast down almost upon the tower itself. The sleet crushed nearly all our most beautiful trees, quite stripping the pines of all branches. For days the clashing of trees was heard everywhere. We never saw such a fearful sleet. The halyards were over 4 inches in diameter. I could not shake off the ice. We have 2 inches of the ice sheet still on the ground (March 4). It has ruined seeding, sending frost down 5 feet into the ground, freezing up our water pipes. It heaved the house at night like an earthquake rocking it.

One of the halyards broke and fell after the pole was bent. All the damage was done before daylight. * * * I saved the windmill by shooting the ice with a shotgun. The phone wires did not break, but the wires to Cross Village are down. I broke the ice from the wires when they became weighted down within reach. All the old wires broke on the old phone.

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ARTHUR WILLIAMS WRIGHT, 1836–1915.

Prof. Arthur Williams Wright (*b.* Sept. 8, 1836), who died at his home in New Haven, Conn., December 19, 1915, was the designer and founder of the first physical laboratory (as we now understand that institution) in the United States, viz, the first Sloane Physical Laboratory of Yale College. This laboratory was completed in 1883, and in 1884 it was one of three stations established under the direction of the Chief Signal Officer (Gen. W. B. Hazen) for the study of atmospheric electricity. Mr. Oliver L. Fassig was detailed to the station and carried on its work for nearly two years, until its discontinuance: but the work in atmospheric electricity was continued in the Sloane Laboratory and the observations have been one of the regular exercises of the students there.

Thanks to this enthusiasm the laboratory secured atmospheric potential observations just before and just after the eruption of Mont Pelée (May 8 and 9, 1902), and these observations were discussed by Prof. Wright in this REVIEW, June, 1905, **33**:241–242.

Prof Wright contributed important papers on the zodiacal light, on the polarization of light from Coggia's comet, and on the gaseous contents of meteoric irons and stones. He was one of the very earliest in this country to repeat, verify, and extend Röntgen's discovery of the X-rays. An appreciative notice of his work is printed by Prof. Charles S. Hastings in "Science" (New York) for February 25, 1916.—C. A., jr.